January 2011 Summary for Southwest Lower Michigan

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Overview

January 2011 was colder than normal and mostly drier than normal. The exception was the area from South Haven to just north of Muskegon, where precipitation was significantly above normal. The month was characterized by persistent cold weather, a dominance of lake effect and lake enhanced snowfall, and little in the way of significant synoptic snow storms. Due to the dominance of lake effect snow events, snowfall was above normal near the lake shore, near normal around US-131 and below normal east of US-131. The snowfall frequency was well above normal across all of Southwest Lower Michigan. Measurable snow occurred on nearly 70 percent of the days in January, which was the highest frequency for measureable daily snowfall since 1994.

January 2011 Summary for Southwest Lower Michigan

TABLE 1. Average temperature, precipitation and snowfall totals for January 2011 at the primary climate stations. Normals are computed from the 1971-2000 30-year average.

Location		Average Temperature (degrees F)	Precipitation (inches)	Snowfall (inches)
Grand Rapids	*Reported*	**21.4**	**1.31**	**21.2**
	Normal	**22.4**	**2.03**	**21.1**
	Departure	**-1.0**	**-0.72**	**0.1**
	Record Max Avg (year)	**41.2 (1933)**		
	Record Min Avg (year)	**4.6 (1977)**		
	Record Max (year)	**68 (1894)**	**4.88 (1897)**	**46.8 (1999)**
	Record Min (year)	**-22 (1994/51)**	**0.29 (1956)**	**0.8 (1933)**
Lansing	*Reported*	**19.2**	**0.88**	**13.8**
	Normal	**21.6**	**1.61**	**14.0**
	Departure	**-2.4**	**-0.73**	**-0.2**
	Record Max Avg (year)	**45.1 (1889)**		
	Record Min Avg (year)	**3.1 (1876)**		
	Record Max (year)	**70 (1875)**	**4.39 (2005)**	**34.6 (1999)**
	Record Min (year)	**-25 (1884)**	**0.24 (2003)**	**1.0 (2002)**
Muskegon	*Reported*	**22.1**	**3.26**	**52.9**
	Normal	**23.5**	**2.22**	**34.4**
	Departure	**-1.4**	**1.04**	**18.5**
	Record Max Avg (year)	**41.1 (1933)**		
	Record Min Avg (year)	**4.8 (1912)**		
	Record Max (year)	**63 (1950)**	**7.72 (1897)**	**102.4 (1982)**
	Record Min (year)	**-21 (1912)**	**0.29 (1934)**	**0.0 (1932)**

January 2011 Summary for Southwest Lower Michigan

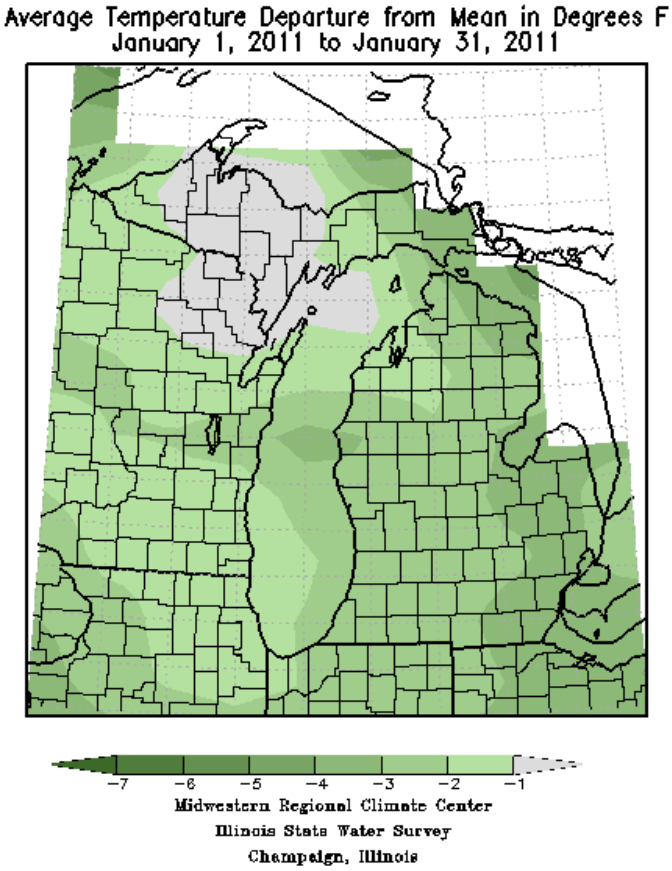

FIG. 1. January 2011 average temperature departure from normal.

Temperatures:

Temperatures for January 2011 ranged from near normal values across northern Lower Michigan to over 3 degrees cooler than normal across parts of the south (Fig. 1). Of the 27 stations that had at least 95 percent of their temperature data, 74 percent were at least 1 degree below normal and 37 percent were more than 2 degrees below normal. The station with the largest negative departure was White Cloud, at 5.2 degrees below normal. White Cloud was also the coldest station coming in with a mean temperature for the month of 16.8 degrees. This was 3.1 degrees cooler than the mean of all 27 stations (19.9 degrees). The warmest station was Grand Haven, which was 0.2 degree above normal and had a mean of 22.2 degrees. This was about 2.3 degrees warmer than the mean for all 27 stations.

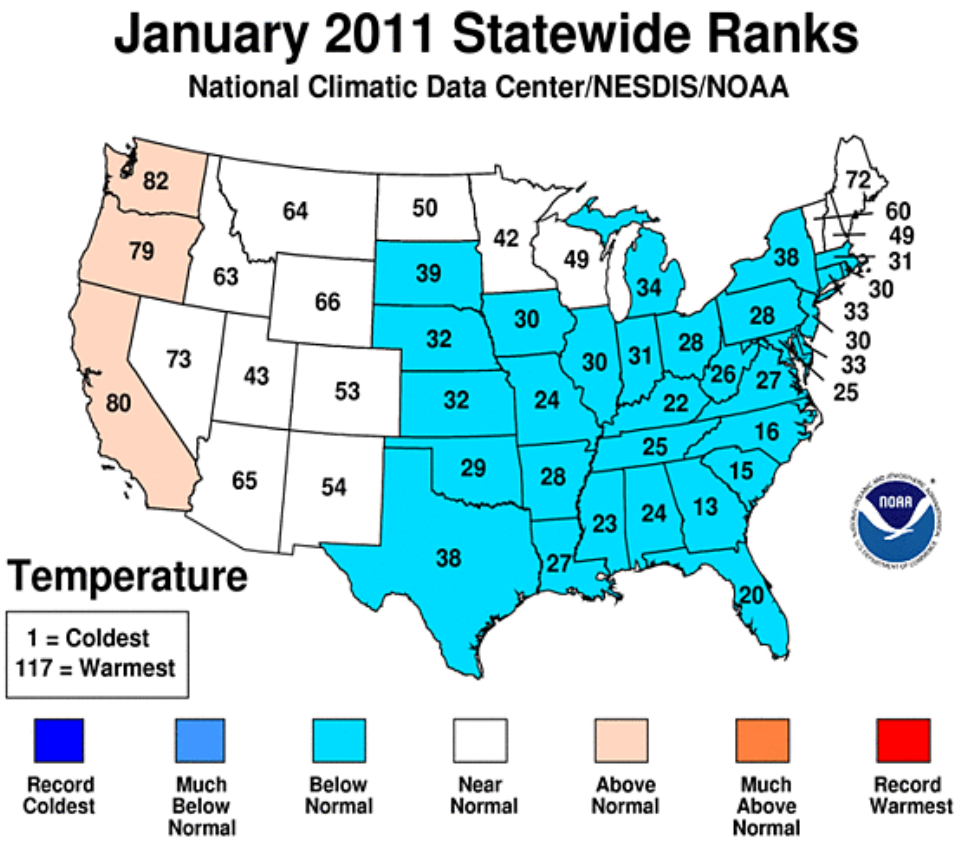

FIG. 2. National Climate Data Center state temperature ranking for January 2011.

January 2011 was the 34th coldest January for the State of Michigan. For all of Southwest Lower Michigan, it was the 33rd coldest since 1895. This was associated with an above normal number of days with high temperatures at or below freezing (Table 2), which also exceeded the numbers from 2010. January 2009, 2010 and 2011 all were above normal in this category. Prior to that, January 2005, 2006, 2007, and 2008 all were well below normal in frequency. For example, January of 2006 recorded only 4 days at Grand Rapids, 5 days at Lansing and 1 at Muskegon.

Each primary climate site recorded a high of at least 50 degrees for the month. This is the first occurrence at each site since 2008. From 2004 to 2008, there were 10 days recorded at Grand Rapids, 11 at Lansing, and 9 at Muskegon, or approximately 2

occurrences per year. This shows a recent decline in the frequency of days with high temperatures of at least 50 degrees.

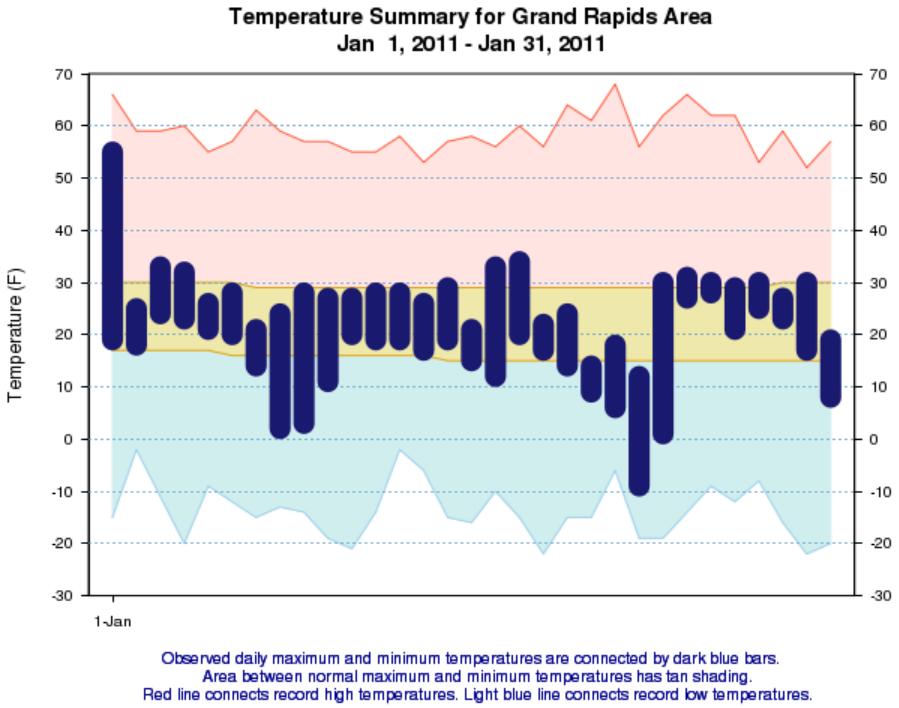

FIG. 3. Observed temperatures at the Grand Rapids International Airport. Dark blue bars are the temperature range for each day. The yellow strip indicates the normal range of temperatures. Record high and low temperatures are indicated at the top of the pink area and the bottom of the blue area, respectively.

At Grand Rapids, January opened with temperatures in the 50s on New Year's Day (Fig. 3). A strong cold front passed through the area, causing temperatures to plunge into the teens by late evening. After the first day of January, temperatures stayed mostly below freezing. The coldest part of the month was from the 21st through the 23rd, when highs stayed below 20 degree for 3 days. The low of -9 degrees on the 23rd was the lowest low temperature since -12 degrees was recorded on February 5th 2007. Overall, this was the most significant cold spell since January of 2009, which was the last time previous to the year when Grand Rapids recorded a low temperature below zero.

January 2011 Summary for Southwest Lower Michigan

TABLE 2. January 2011 temperature frequencies at the primary climate stations.

Number of days	Grand Rapids	Lansing	Muskegon
highs ≥ 50 (2011)	1	1	1
highs ≥ 50 (2010)	0	0	0
highs ≥ 50 (normal)	0.9	1.1	0.4
highs ≥ 50 (record)	8	8	4
year(s) of record	1916	1880, 1890	1950
highs ≤ 32 (2011)	27	28	26
highs ≤ 32 (2010)	22	24	21
highs ≤ 32 (normal)	19.1	19.1	17.3
highs ≤ 32 (record)	31	31	24
year(s) of record	1977	1977, 1918	1989
lows ≤ 32 (2011)	31	31	31
lows ≤ 32 (2010)	30	30	29
lows ≤ 32 (normal)	29.0	29.2	28.9
lows ≤ 32 (record)	31	31	31
year(s) of record	Many	Many	Many
lows ≤ 0 (2011)	1	1	1
lows ≤ 0 (2010)	0	0	0
lows ≤ 0 (normal)	3.5	4.6	1.6
lows ≤ 0 (record)	11	15	11
year(s) of record	1994	1887,1893	1912

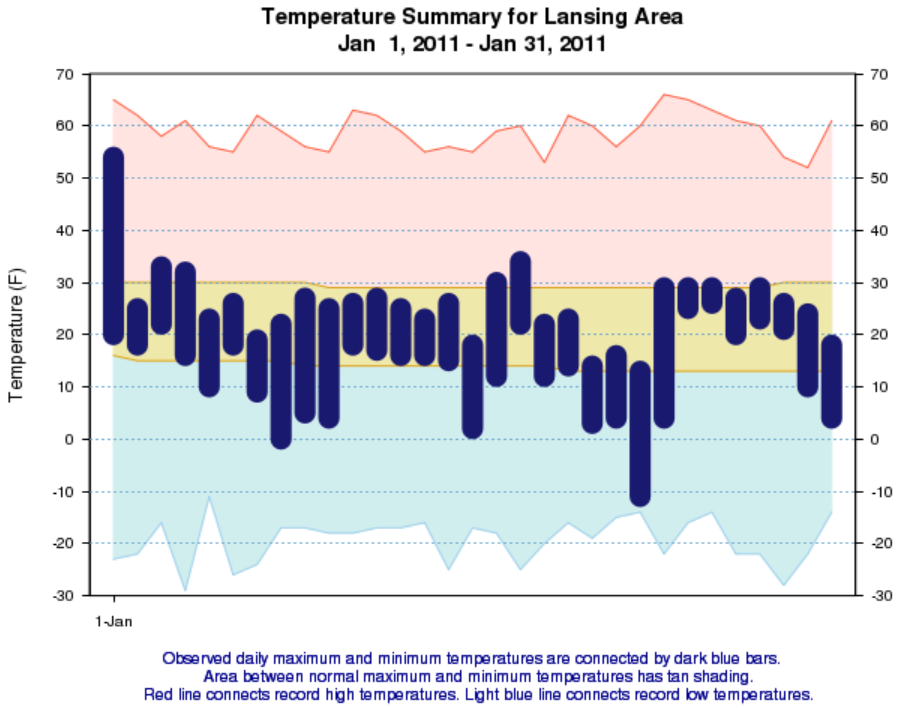

FIG. 4. As in Fig. 3, except for the Lansing/Capital City Airport.

At Lansing, January also opened with temperatures in the 50s on New Year's Day (Fig. 4). A strong cold front then passed through causing temperatures to plunge into the teens by late evening. After the first day of January, temperatures stayed mostly below freezing. The coldest part of the month was from the 21st through the 23rd. Highs stayed below 20 degree for 3 days. The low of -11 degrees on the 23rd was the first low temperature below zero since February 5th, 2009 and was coldest low since the -16 degree low recorded on January 24th and 25th in 2004.

At Muskegon, like in Grand Rapids and Lansing, January opened with temperatures in the 50s on New Year's Day (Fig. 5). A strong cold front then passed through causing temperatures to plunge into the lower twenties by late evening. After the first day of January, temperatures stayed mostly below freezing. The coldest part of the month was from the 21st through the 23rd. Highs stayed below 20 degrees for 3 days. That was the longest string of days in a row with highs below 20 degrees since a 5-day string in early February of 2007. The low of -8 degrees on the 23rd was the first low temperature below zero since February 5th, 2009 and the coldest low since the -10 degrees recorded on January 23th, 2005.

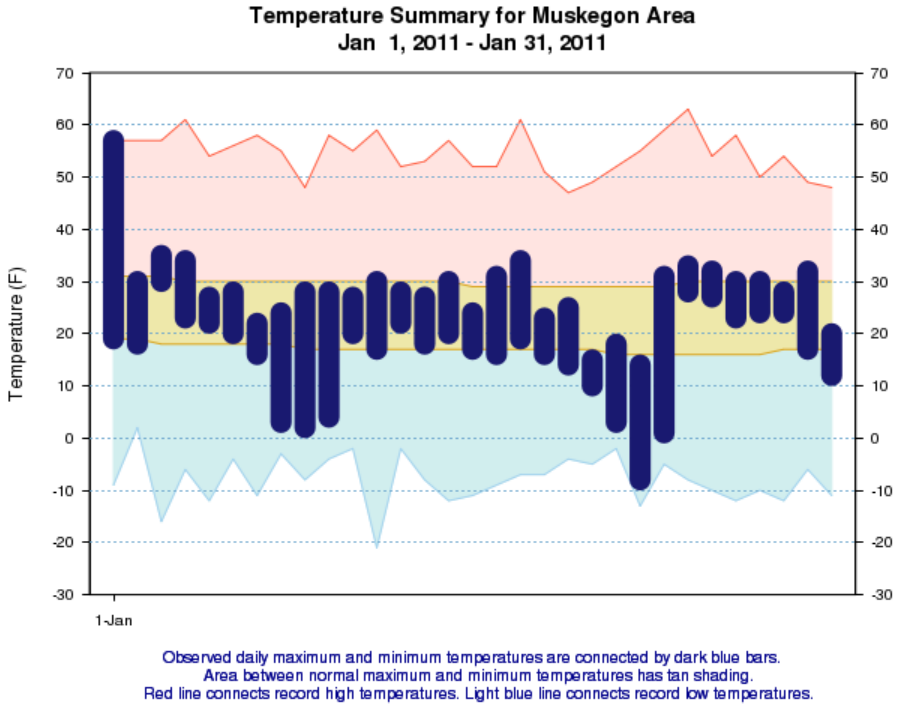

FIG. 5. As in Fig. 3, except for the Muskegon County Airport.

Precipitation:

The vast majority of precipitation fell west of Highway 131 closer to the lakeshore (Fig. 6). Amounts ranged from 0.65 inches at Battle Creek to 3.64 inches at Grand Haven. The average for the entire County Warning Area was 1.62 inches, which was 0.14 inches below normal. Nealy all of the precipitation that fell was snow. Only the storm on the 1st produced any significant rainfall. Except for the Lake Shore area from South Haven to Muskegon, the overall precipitation was below normal for January 2011 (Fig. 7). Local station departures from normal ranged from 1.43 inches above normal at Grand Haven to 1.20 inches below normal at both Jackson and Battle Creek.

For the state of Michigan, January 2011 was the 39th driest on record out of 117 years of data (Fig. 8). Southwest Lower Michigan was slightly wetter than the rest of the state, coming in at 51 driest out of 117 years. This puts Southwest Lower Michigan in the near normal category for total monthly precipitation.

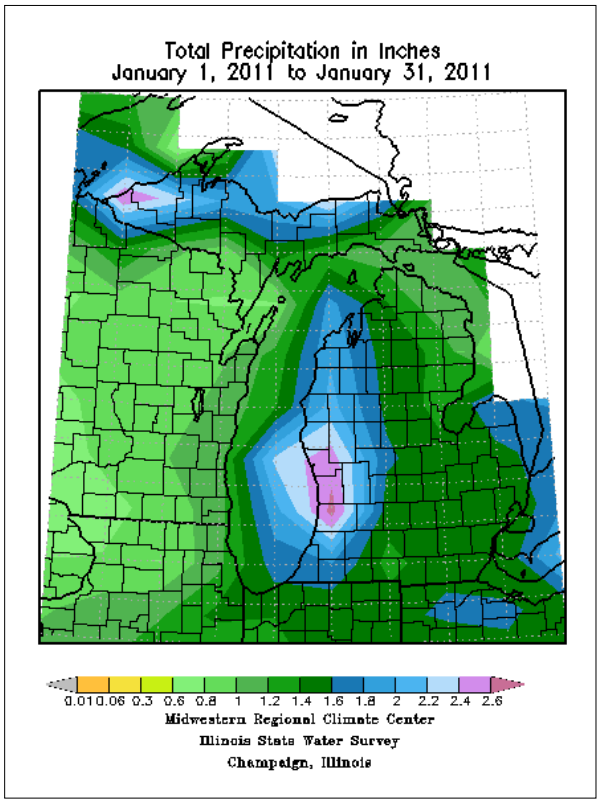

FIG. 6. Total precipitation for Michigan during January 2011.

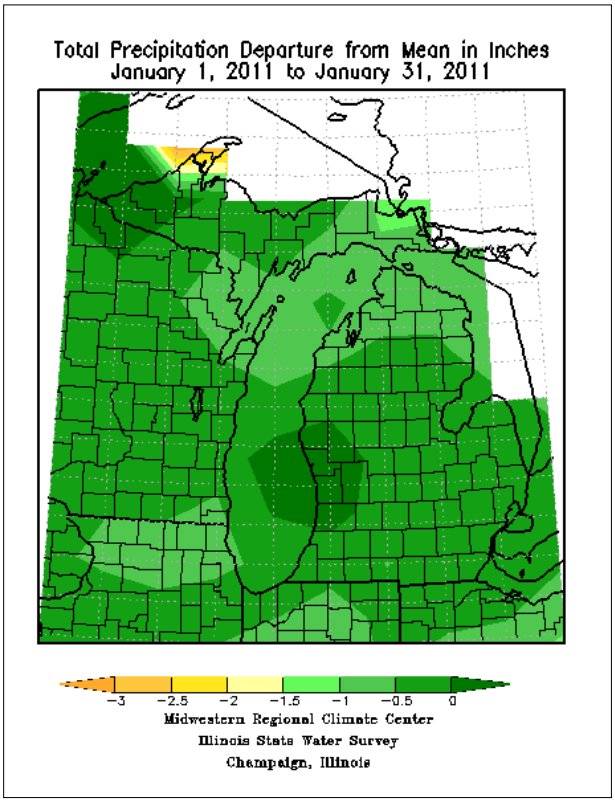

FIG. 7. Precipitation departure from normal for Michigan during January 2011.

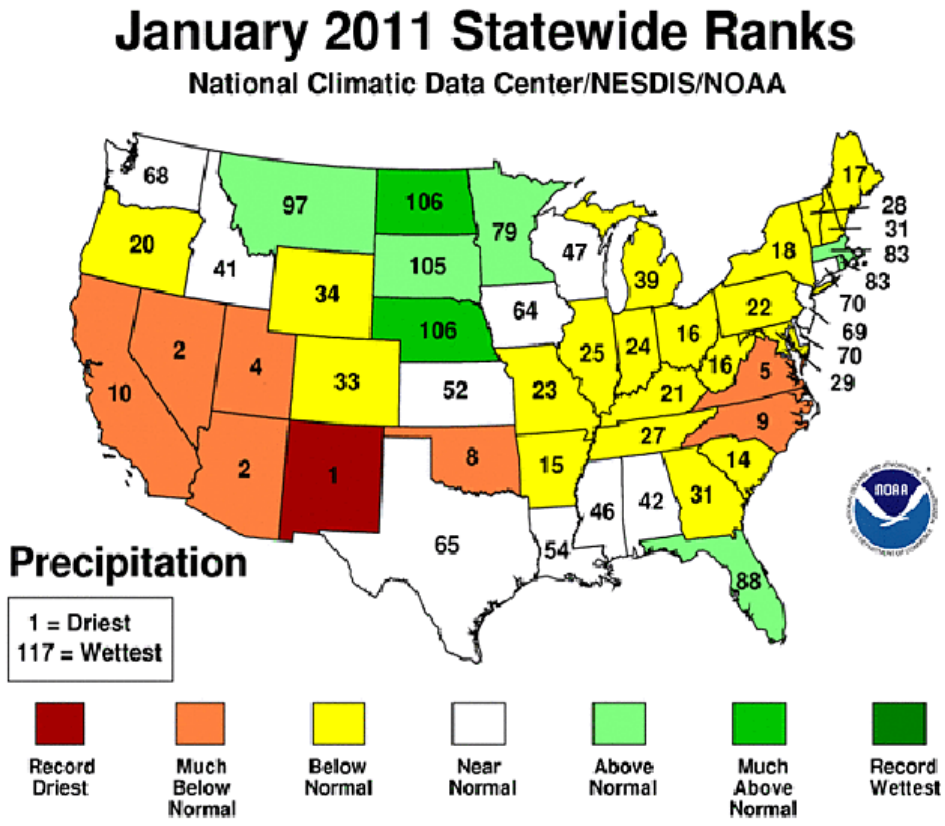

FIG. 8. National Climate Data Center state precipitation ranking for January 2011.

The daily data at the three primary climate sites (Fig. 9-11) show daily precipitation was a common occurrence. There were only 2 days with not even a trace of precipitation at Muskegon, and 4 days at both Grand Rapids and Lansing.

Grand Rapids recorded measureable precipitation on 20 days. Lansing and Muskegon reported 15 and 23 days of measureable precipitation, respectively. This compares to a normal frequency of 17 days at both Muskegon and Grand Rapids, and 15 days in Lansing. Since 1975, there were only 2 Januaries that recorded more measureable precipitation days at Muskegon. For Grand Rapids, there have been 5 such Januaries since 1975.

Both Grand Rapids and Lansing never recorded more than 0.20” of precipitation from midnight to midnight on any day. This made it possible for precipitation totals to remain below normal in spite of a high frequency of precipitation days.

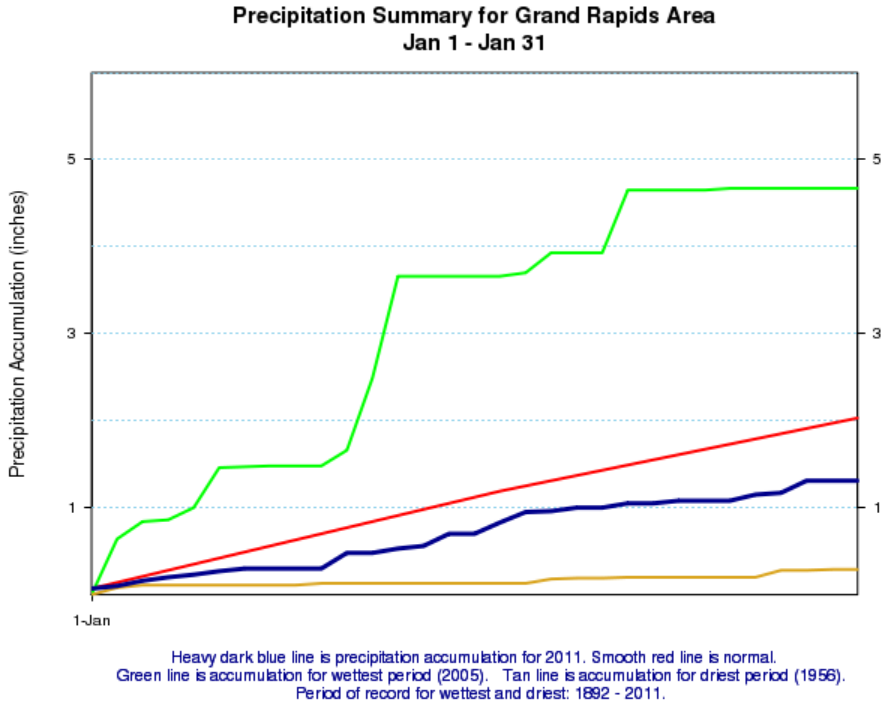

FIG. 9. Precipitation accumulation in inches for January 2011 at the G.R. Ford International Airport.

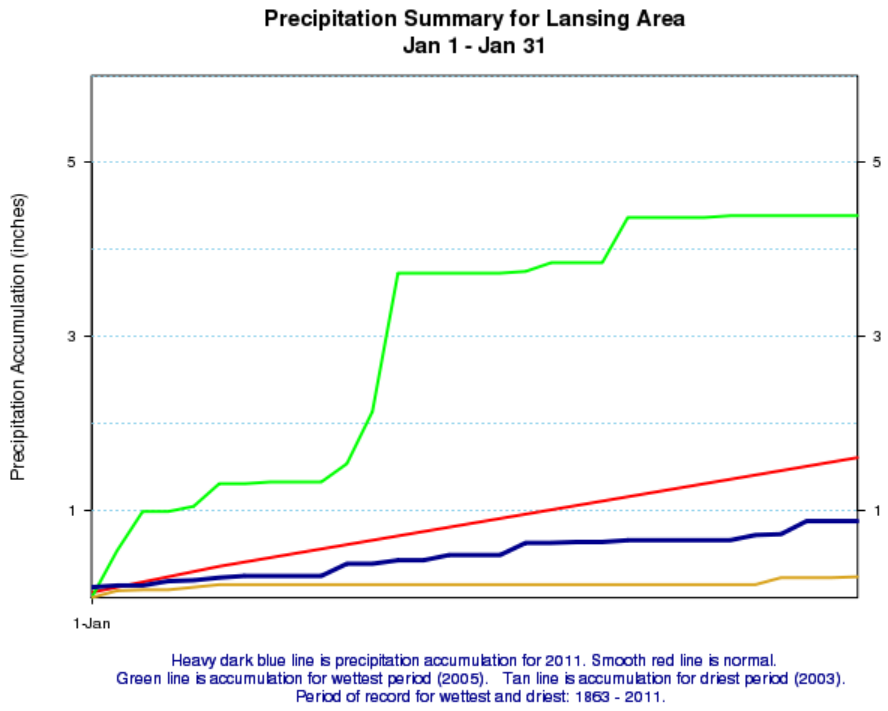

FIG. 10. As in Fig. 10, except for the Lansing Capital City Airport.

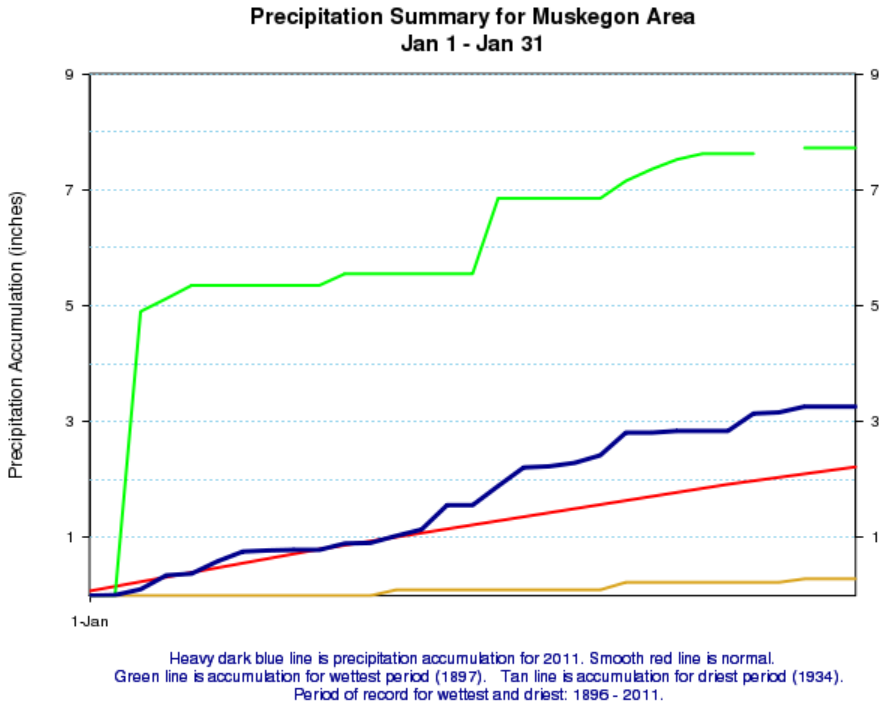

FIG. 11. As in Fig. 10, except for the Muskegon County Airport

Muskegon had five days with more than 0.25 of an inch of precipitation from midnight to midnight. There were no days with more than 0.50 inches of precipitation. Muskegon's precipitation briefly crested above normal around the 4th. After the 15th it remained above normal for the rest of the month.

Snowfall:

The greatest amount of snowfall occurred over the northwestern part of Southwest Lower Michigan (Fig. 12). Scottville in Mason County recorded the most snowfall with 56.3 inches. Walker in Ocean County was a close second with 55.9 inches. Muskegon Airport with 52.9 inches was third. The 43 station average snowfall for Southwest Lower Michigan in January was 27 inches. The minimum snowfall reports were 10 inches at Jackson and 11 inches at Kalamazoo and Alma. Most of the snowfall in January was either lake enhanced snowfall or pure lake effect, which is why snowfall amounts decreased dramatically away from Lake Michigan.

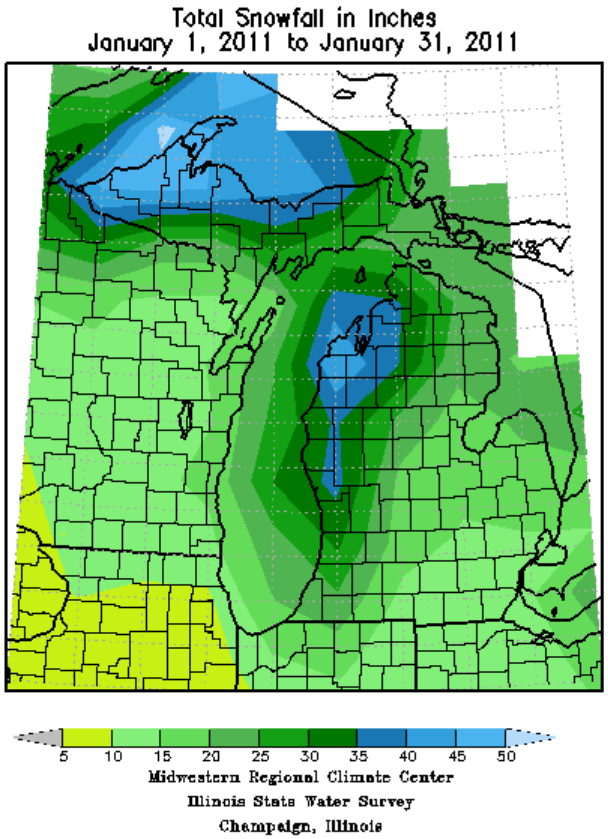

FIG. 12. Snowfall total for Michigan during January 2011.

Overall, snowfall was above normal for the month (Fig. 13). Muskegon was 18.5 inches above normal and was the highest reported departure from normal. Most areas west of US-131 had above normal snowfall. Areas east of US-131 were mostly near normal. As was the case with daily precipitation, the frequency of measureable snowfall was well above normal over the western areas and near normal over the east.

At Muskegon, there were 23 days with measureable snow, compared to a normal of 17 days. This was the greatest number of days since January of 1984 (24 days), 1982 (25 days), and 1977 (25 days). Grand Rapids and stations with very low totals show similar numbers. This indicates that, while it snowed on almost every day, most locations had light accumulations. Snow cover was present across most of the area throughout January.

January 2011 Summary for Southwest Lower Michigan

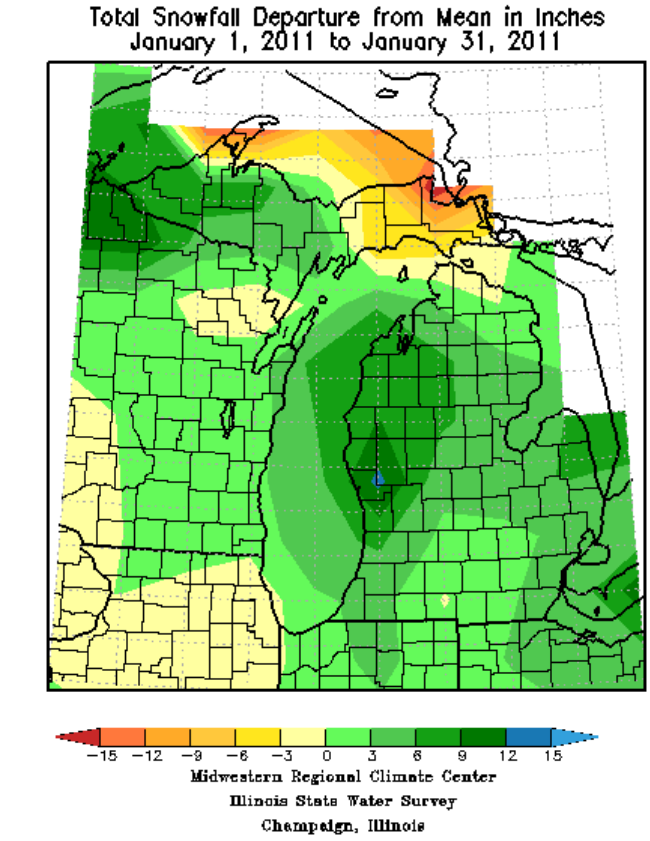

FIG. 13. Snowfall departure from normal for Michigan during January 2011.

January 2011 Summary for Southwest Lower Michigan

Highlights of the month of January 2011

1st – 2nd

A strong cold front came through early in the morning, causing emperatures to fall from the 50s prior to sunrise into the teens after dark. There was some lake enhanced snowfall that brought 1 to 2 inches near and west of US-131.

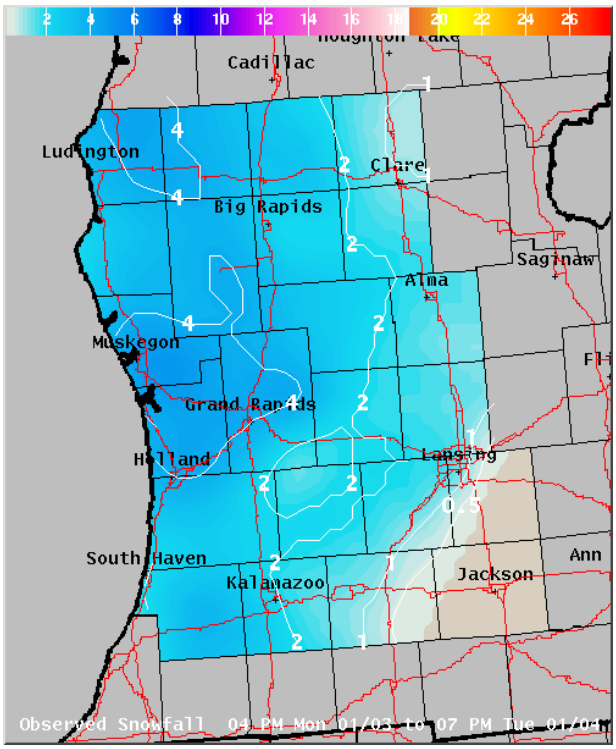

FIG. 14. Snowfall January 3rd into the 4th 2011.

3rd – 4th

A clipper system moved east north of Lake Superior, bringing lake effect snowfall across the area. Most of the snow fell west of US-31. In that area 2 to 5 inches fell (Fig. 14). The heaviest snowfall was between Holland and Muskegon, where 4 to 5 inches fell. The heaviest snowfall occurred from mid morning into early afternoon on the 3rd, when Muskegon had about 3.5 inches of the 4.9 inches that fell during the storm.

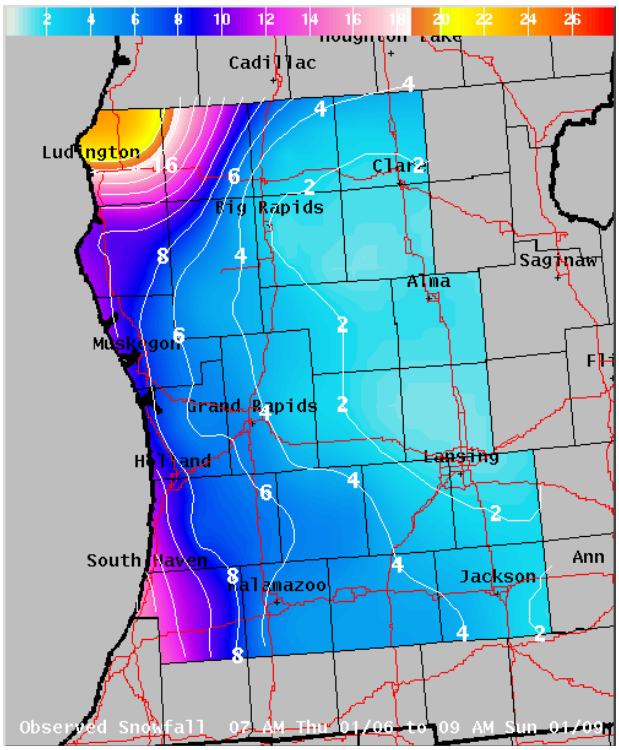

FIG. 15. Lake effect snowfall January 6th into the 9th 2011.

6th – 9th

Another clipper system tracked across Lake Superior from the 6th into the 7th and brought arctic air to the region. It also brought a prolonged lake effect snow event to areas near the Lake Michigan shore along and west of US-31. Heavy snow fell each day from the 6th through the 9th. Over a foot of snow fell from South Haven south and one to two feet north of Little Sable Point. Between those two points, 6 inches to a foot fell (Fig. 15). The heaviest reported storm total snowfall was 21 inches 6.6 miles north northwest of Scottville. Meanwhile in Van Buren County, 1.4 miles south southeast of Buchanan had nearly as much with 19.5 inches of snow. Numerous traffic accidents occurred on I-96 west of Lansing, I-94 east of Jackson, US-131 and US-31 along their entire lengths. Sections of I-94 and US-131 were closed from time to time during this event.

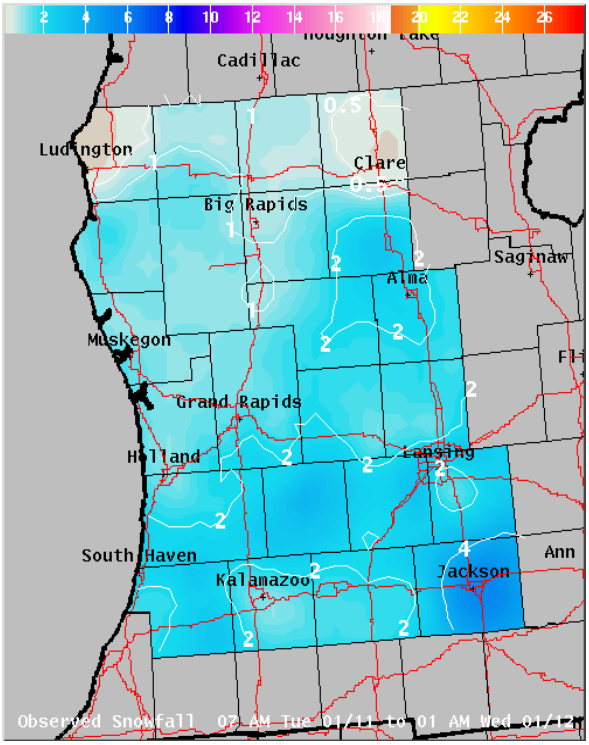

FIG. 16. A storm system passes south of Michigan bringing up to 4 inches of snow near Jackson from the 11th into the 12th.

11th – 12th

A synoptic snowstorm passed from northern Indiana during the morning of the 11th into Ohio by early afternoon on the 11th. By mid evening on the 11th the storm's center was over extreme northwest Pennsylvania. This brought a period of moderate to heavy snow into Jackson County from mid morning into the late afternoon of the 11th. In Jackson County 3 to 5 inches of snow fell, with the highest amount, of 5.1 inches falling 1 mile northeast of the city of Jackson. The rest of the area south of I-96 had 2 to 3 inches of snow (Fig. 16). Temperatures stayed below freezing.

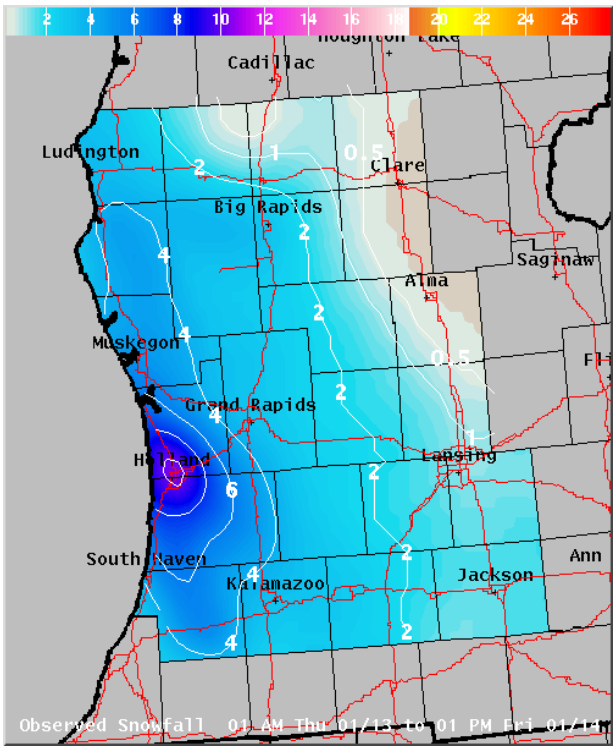

FIG. 17. A storm system passes Michigan bringing over 6 inches of snow near Holland from the 13th into the 14th.

13th - 14th

A weak clipper system headed for upper Michigan and brought lake enhanced snowfall west of US-131 (Fig. 17). Most snow fell from around 7 AM to 8 PM on the 13th, with the heaviest snowfall in the afternoon. Snowfall amounts of 6 to 9 inches fell near Holland but elsewhere west of US-131, 4 to 5 inches fell. Areas east of US-131 got between a half inch and 2 inches. Temperatures stayed below freezing across the area and winds were mostly less than 10 mph during this entire event. Two deaths related to traffic accidents occurred - one in Muskegon County near Fruitport during the evening of the 13th, and other was in Ionia during the morning of the 14th.

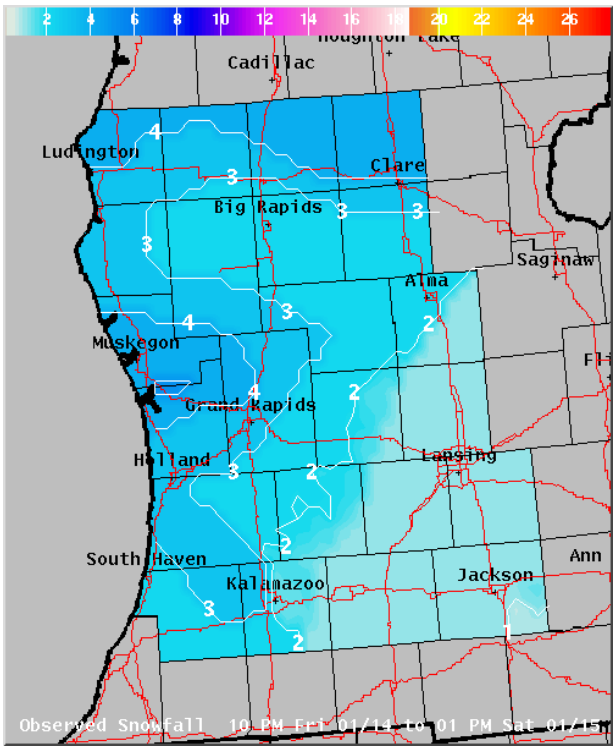

FIG. 18. A storm system passed north of Michigan bringing 2 to 4 inches northwest of a Kalamazoo to Alma line from the 14th into the 15th.

14th – 15th

Yet another clipper system brought 2 to 6 inches of lake enhanced snowfall north of a line from Kalamazoo to Lansing (Fig. 18). There were 3 to 6 inches of snowfall along the lake shore north of Holland. There was also 4 to 5 inches over western and northern Mason county, northern Lake, northern Osceola and most of Clare County. The snow fell mostly from the late evening hours of the 14th into late morning hours of the 15th. Muskegon Airport reported 4.4 inches of snow from the event. Winds were gusting to 30 mph during the early morning hours of the 15th but temperatures near freezing kept snow wet and mitigated a significant amount of blowing and drifting of the snow.

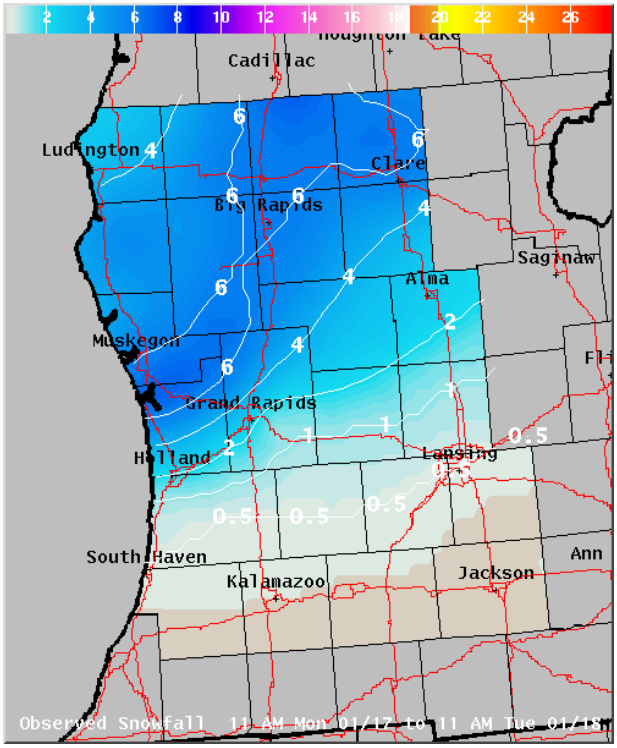

FIG. 19. A storm system near I-94 bringing up 4 to 6 inches of snow north of I-96.

17th – 18th

An arctic front trailing a clipper low that tracked east southeast just north of Lake Superior brought a freezing rain and snow event to Southwest Lower Michigan. There was a second low pressure system on the front that tracked just south of Interstate 94. It was this system that brought enough warm air to turn the snow to rain near and south of Interstate 96 from Grand Rapids east, during the evening of the 17th. In the area that stayed all snow, north of I-96, 4 to 7 inches of snow fell (Fig. 19). Hersey in Osceola County reported 7.2 inches for the maximum reported snowfall from the event. Very little snow fell south of Interstate 96. Between one and two tenths of an inch of ice accumulated from 7 PM and midnight between I-96 and I-94 and as far east as Battle Creek. This caused numerous traffic accidents across the Holland, Grand Rapids, Kalamazoo, and Battle Creek areas. Many schools in these areas were closed on Tuesday, January 18th.

January 2011 Summary for Southwest Lower Michigan

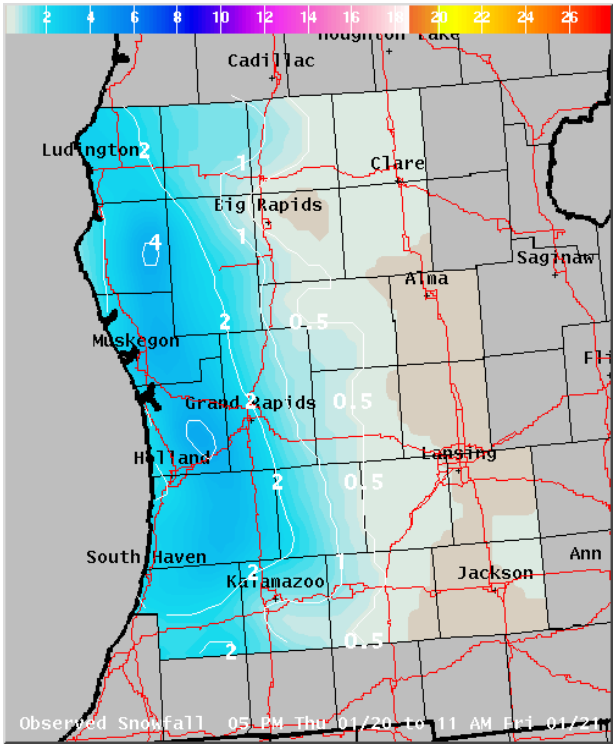

FIG. 20. A lake effect snow event results in up 2 to 4 inches of snow west of US-131 from the 20th into the 21st.

20th – 21st

An arctic front with a clipper low that tracked across Lake Superior brought Lake enhanced snowfall west of US-131 from South Haven through Ludington. Snowfalls of 2 to 4 inches fell west of US-131 (Fig. 20). Walkerville in Oceana County had 3.9 inches for the maximum reported snowfall for this event. The combination of gusty winds and falling snow created dangerous driving conditions. This caused numerous accidents from Battle Creek west along I-94, US-131 from Kalamazoo to north of Grand Rapids, and on US-31 and US-196 between South Haven and Muskegon.

21th – 23rd

After the passage of the arctic front on the 21st, the coldest air of the season followed. High temperatures were in the teens from the 21st through the 23rd across the area. Lows were near to below zero at night during this time. This was the coldest cold wave since January of 2009.

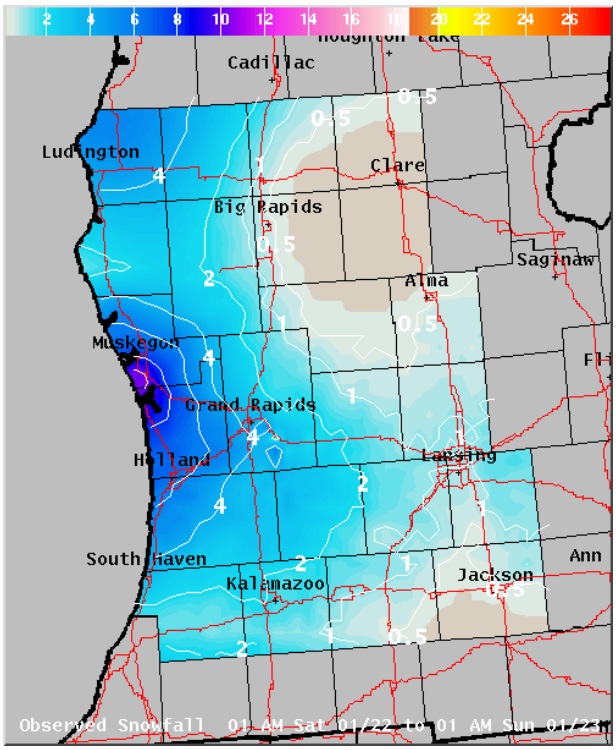

FIG. 21. Observed snowfall from the lake effect snow event January 22nd into the 23rd.

22th – 23st

Another clipper system and arctic front brought heavy snow squalls from north of South Haven to Ludington and near and west of US-131. This resulted in numerous traffic accidents between Holland and Grand Rapids in near whiteout conditions on I-196 and US-131 from late morning into the afternoon. Snowfall amounts of 4 to 11 inches were common near and west of Grand Rapids into the Muskegon and Holland areas (Fig. 21). Muskegon had a record daily snowfall of 10.7 inches and 11 hours of steady moderate to heavy snow. Winds became gusty, causing some blowing and drifting snow during the afternoon. Temperatures stayed in the teens during this time.

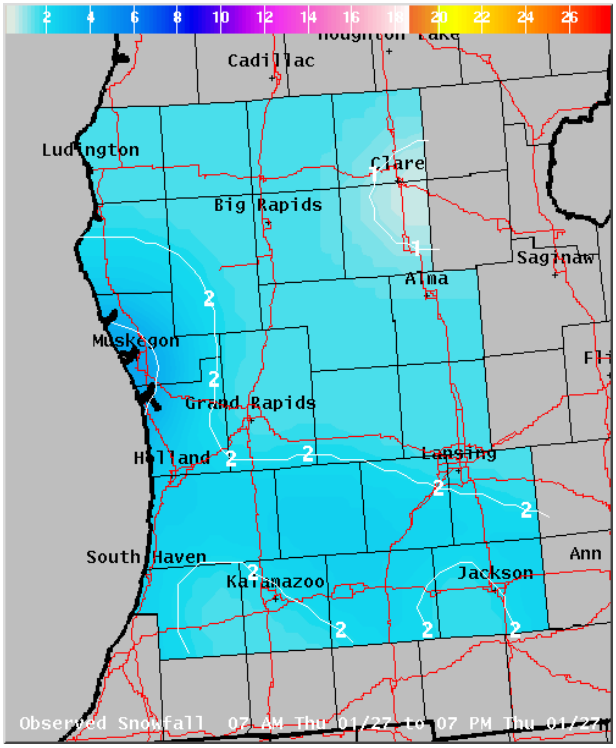

FIG. 22. Clipper system passes north of Lower Michigan bringing 2 to 4 inches south of Interstate 96 and along the lake shore west of US-131.

27th

Another clipper system tracked north of Lower Michigan. This brought an area of 2 to 4 inches of snow south of Interstate 96 and along the lake shore west of US-131 (Fig 22). Muskegon had the heaviest snowfall with this event, reporting 3.9 inches by 7 AM on the 27th. Most of that snow fell between 8 AM and 2PM on the 27th.

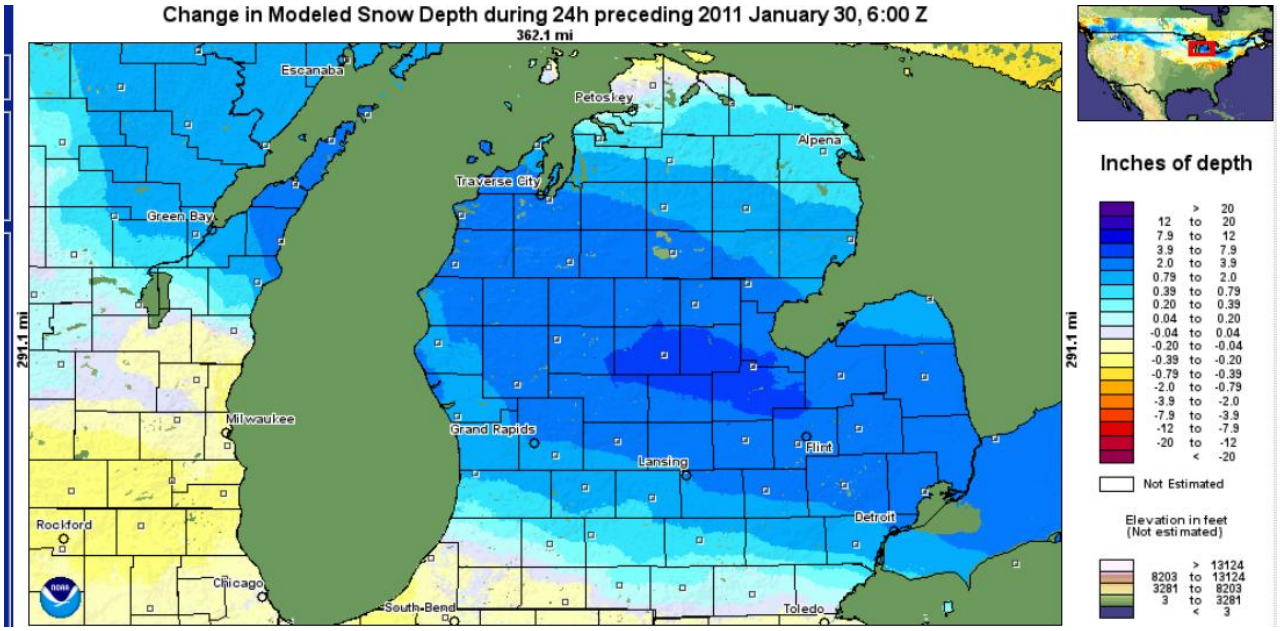

FIG. 23. Clipper system passes north of Lower Michigan bringing 2 to 4 inches north of Interstate 96 and along the lake shore west of US-131.

28th – 29th

The final Alberta Clipper system of the month tracked southeast from Minnesota during the morning to northern Indiana by early Saturday morning. This brought a large area of 3 to 5 inches of snow north of Grand Rapids (Fig. 23). The city of Clare had the greatest reported snowfall of 5 inches. Most of the snow fell during the early morning hours of the 29th.